Содержание

SSG changelog and update

DPI/BNG Versions Update

If you have version of CentOS 6.x or CentOS 8.x installed, switch the repository once with the command:

```
sed -i -e '/^mirrorlist=http:\/\//d' -e 's/^#
*baseurl=http:\/\/mirror.centos.org/baseurl=http:\/\/vault.centos.org/'
/etc/yum.repos.d/CentOS-*.repo
```

Then run updates as usual:

```
yum update fastdpi
```

After updating, restart the DPI:

```
service fastdpi restart
```

and other dependent procoesses (PCRF/Radius), but only if they are actually used and their configuration is valid:

```
service fastpcrf restart
service fdpi_radius restart
```

You can update the operating system components ( Do not update the kernel version and its dependent utilities ):

For CentOS 6.x:

```
yum --exclude=kernel*,util-linux-ng,libuuid,libblkid update
```

For CentOS 8.x:

```
yum update
```

 It's essential to update the module for browsing statistics and reports in order to ensure the correct storage and displaying of new protocols.

 The idle time of the service (during the restart) takes 1-3 seconds [1)]

Note for users running the DPI in a virtual environment, using old CPU (release of 2009) and AMD CPU:
run the following command before the update

```
touch /etc/dpi/noprioadj
```

and it causes the DPI process to be launched with normal priority (not the realtime), thus significantly reducing the consumption of CPU system (sys) resourses, but slightly increasing the latency on the platform.

Version 12.00 Machu Picchu

Changes in version 12.00 Machu Picchu

12.0 Machu Picchu [2)]

1. Changed: switch to DPDK 22.11 LTS
2. Added: parsing of 'Chaos Protection' header to QUIC IETF
3. Added: cold parameter `nat_transcode_cidr` Info, which specifies CIDR of provider's public addresses. It is possible to use 2 CIDR parameters when re-coding from public to private for NAT 1:1. Any public address can be assigned to the private address for NAT 1:1.
4. Changed: hash function for distribution by worker threads: (crc(ip_src) % nthread + crc(ip_dst) % nthread) % nthread
5. Changed: public address allocation algorithm for CG-NAT: crc(private) % nthread + crc(public) % nthread
6. Changed: the message '[NFLW] very long operation ....' is always displayed no matter how many times the message is repeated
7. Changed: the name of the file record directory - added stream
8. Added: information output statistics for sending NetFlow/IPFIX

```
    [STAT    ][2022/11/20-17:55:03:213770] Statistics on NFLW_export :
{a/b/c%/d/e}

    a - the number of cycles of sending executed
    b - the number of cycles of sending, when the time spent on sending
exceeded the period of execution of cycles
    c - percentage of exceeding the number of the cycles: 100 * b/a
    d - time of the maximum duration of the cycle microseconds
    e - time of the period of sending statistics, microseconds
(''netflow_timeout'' parameter value (is set in seconds))

    E.g.:
    [STAT    ][2022/11/20-17:55:03:213770] Statistics on NFLW_export :
{7/0/0.00%/45297us/30008163us}
```

9. [PCRF][PPPoE] Fixed: previously, if Radius responded with an IPv6 address instead of a prefix,

we did not make the prefix from the address, which led to recreation of the acct-sessions. Newly created acct-sessions used to be without login and other important attributes for ISPs.
10. [BRAS][L3-AUTH] Changed: Framed-Route is no longer applied to PD-prefix
11. [PCRF][ACCT] Fixed: previously, when an entry was unlinked from a multisession, the IP addresses for the multisession were not corrected. Unlink occurs during aggregation. As a result, other entries, which had no relation to this multisession, may have been bound to it later.
12. [PCRF][DHCPv6-Pool] Fixed: Forming the Link-Address field for Relay-Fwd when sending a request to a specific DHCPv6 server
13. [BRAS][PPPoE-IP6] IPv6 address request from Framed-IPv6-Pool is performed when the first IP6CP Cfg-Req comes from the client
14. [CLI][ACCT] Added: fastdpi-server NAS attributes output in pcrf acct show commands
15. [BRAS][DHCP] Fixed: Sending a NAK to a DHCP-Request for another server
16. Added: support for DDP profiles for Intel 700-series NICs (i40e driver) for PPPoE/GTP/MPLS tunnel balancing when using dpdk_engine=2. DDP is loaded from /lib/firmware/intel/i40e/ddp/i40e.pkg file during i40e ports initialization. Lifetime of the loaded DDP profile: until the server is rebooted.
17. Changed: algorithm for selecting a server for recording SDS
18. [CLI] Added: setting L2 subs_id in the `subs prop set` command
19. [BRAS][DHCP-Relay] Added: support for L2 `subs_id`
20. [BRAS][AUTH] Added: support for `l2subs_id` for L3-authorization, since the L3 auth response from the Radius may indicate that it is an L2 subscriber
21. [BRAS][ARP-AUTH] Added: support for `l2subs_id`
22. [BRAS][PPPoE][CLI] Added: `l2lan_id` attribute for PPPoE sessions
23. [BRAS][PPPoE] Removed support for MAC authorization, without login and password, removing `bras_ppp_mac_auth` option
24. [PPPoE][CLI] Added: support for the `subs_id` parameter that identifies the PPPoE session
25. [BRAS] Added: `l2lan_id` class - L2 network identifier. `l2lan_id` is intended for separating subscribers by VLAN. The `l2lan_id` is derived from the `l2subs_id`, i.e. its formation is set by the same `bras_subs_id` option. Basically, `l2lan_id` is a VLAN prefix from `l2subs_id`.
26. [BRAS][DHCP] All internal DHCP session databases now consider `l2lan_id` - it is included in their MAC and Client-Id key. That is, two subscribers with the same MAC-address, but in different VLANs, are considered different subscribers (if `bras_subs_id` is set to consider VLANs). Opt82 and Q-in-Q secondary keys do not consider `l2lan_id`. Read more about bras_subs_id
27. Added: configuration parameter `rx_dispatcher` Info flow hashing method by worker threads; 0 - old method is used by default (ip_src+ipdst)%N) & ip_mask; 1 - new method is used with recoding support for NAT1:1 (CRC(IP SRC)%N+CRC(IP_DST)%N)%N
28. [Radius monitor] Added: support for exporting NAS address and port and other attributes
29. [Radius monitor] Added: connection of service 12
30. [BRAS] Added: setting `bras_ppp_lcp_start_timeout`

Changes in version 12.1

1. Added: NAT diagnostic information
2. Added: On-Stick mode support
3. Minor changes in CG-NAT
4. Support for service 12 [3] on VCHANNEL
5. Support for protocols with names that can be downloaded from the cloud

6. SDS: transfer data in pcapng format

Changes in version 12.2

1. Corrections to the CG-NAT utilization statistics output
2. Parsing the new GQUIC versions
3. New service 16 – allow list (captive portal) without access of subscribers to the Internet (due to failure of uplinks, subscriber in long-term blocking, etc.)
4. New dpdkinfo utility (-h hint, module_eeprom – information on SFP module optical diagnostics, if supported by the module)

Changes in version 12.3

1. Added: VRF support in router
2. PPPoE authorization management service based on Service-name field. Description under PPPoE Authorization Setup
3. Added: support for sending heartbeat for external bypass
4. Added: extract and transfer to IPFIX of cookies from `Set-Cookie`
5. Improved: blocking of the short TCP protocol freezes in IPFIX threads via additional `user timeout` setting (in addition to the standard `tcp keep alive` mechanism)
6. Added: performant `rx_dispatcher=2` with even balancing over an arbitrary number of flows (but no support for `nat1:1` with the requirement to assign specific addresses). Description under Settings and management
7. [BRAS][PPPoE] Fixed: `dual-stack`: adding IP addresses to an existing `acct session`
8. [PCRF] Fixed: switch `persist queue` to "connected" mode
9. [CLI] Added CLI command `fdpi_cli pcrf persist queue reconnect`, which allows to make a reconnect to fastDPI without resetting the queue. Can be applied to a specific connection or to all connections. Description under FastPCRF Management
10. [PCRF][PPPoE][Framed-Pool] Fixed: create acct-session with `session_id` announced during authorization
11. Added support for `pcapng` format for recording to storage
12. [CoA] Added processing of CoA Update by `l2subs_id`. Description under Radius CoA
13. Added: saving ICMP protocol translations in NAT exports
14. Changed: `nat_exclude_private` Info parameter and corresponding support: `int nat_exclude_private`;
    Bitmask to avoid NAT for private addresses:
    0 - always do private → public conversion
    1 - do not do NAT for private addresses (`ip_src` and `ip_dst` are private or are in `psz_prms_user_private`)
    2 - `ip_src` is private given `psz_prms_user_private` and AS for `dst_ip = local`
    4 - `ip_src` - private with `prms_user_private` and AS for `dst_ip = peer`. Description under Settings and management
15. [CoA] Added processing of CoA Reauth by `l2subs_id`. Description under Radius CoA
16. [CoA] Added CoA Disconnect processing by `l2subs_id`. Description under Radius CoA
17. [fDPI] Maximal number of clusters increased from 10 to 12
18. [PCRF][ACCT] Added: pass `VasExperts-L2-SubsId` attribute to `Acct Start/Interim/Stop`. Description under Radius attributes
19. [DPDK] Added: `disable Ethernet Flow Control` on port startup

20. [PCRF][DHCPv6-POOL] Fixed generation of Client-DUID when composing DHCP6-RENEW for Framed-IPv6-Pool
    The Client-DUID must be immutable throughout the DHCPv6 session, otherwise the DHCPv6 server may issue a **different** IPv6 prefix on Renew, resulting in PPPoE session closure. To achieve immutability, the Client-DUID is now formed from the subscriber's `l2subs_id`.
21. [PCRF][DHCP-POOL] Fixed 'request-response' identification when working with DHCP pools.
    The identifier used is:
    For DHCPv4 – subscriber MAC address `(chaddr)` + request `xid` \\For DHCPv6 – `Client-Id` option and `xid` of the request.
    The server is required to pass the `Client-Id` option in the response, unlike other request options.
22. [BRAS] Added CLI command `dhcp show stat vrf`
    Display the number of DHCP subscribers by VRF
23. [PCRF] Added CLI-command `pcrf radius enable/disable`
24. [PCRF] Added CLI command `pcrf radius ping`
25. [PCRF] Added CLI command `pcrf radius status`
26. Changed: if session has no public address - CG-NAT is enabled.
27. Added: if service 11 is removed, NAT is disabled and resources are released. Occurs only if there is read data on flow
28. [BRAS][DHCP] Use the subscriber MAC address from DHCP request `for l2subs_id`.
    The `srcMAC` from the ethernet header of the packet is used to generate the L2 subscriber ID (see `bras_subs_id`). In case DHCP requests go through DHCP Relay, the `srcMAC` in the ethernet header of the DHCP packet is no longer the MAC address of the subscriber. DHCP requests of all subscribers passing through DHCP Relay have the same MAC in the ethernet header and the same `subs_id`.
    Solution: to generate the L2 identifier, the subscriber's MAC address is now taken from the DHCP packet, `chaddr` field.
29. [PCRF] watchdog - new Radius server monitor. Description under Full list of settings
    New fastpcrf.conf parameters:
    - Radius-servers ping timeout, in seconds.
      If there are no authorization requests, fastPCRF periodically pings Radius servers by sending a Server-Status or Access-Request. If the server responds, it is considered available. The default value is 60 seconds. `radius_keepalive=60`
    - User-Name (`radius_ping_user_name`) and Password (`radius_ping_user_password`) of the pseudo-subscriber for ping requests.
      FastPCRF attempts to maintain a connection to all described Radius servers by periodically sending a ping request to the servers.
      A ping request is a Status-Server request (if Radius supports it) or a regular Access-Request with User-Name and Password specified. These parameters set User-Name and Password for Access-Request ping requests (Server-Status does not use these parameters). For the FastDPI process, the fact itself that the server responds to the ping request is important, the content of the response (Access/Reject and their attributes) is not analyzed. If User-Name and Password data are not specified – the Access-Request ping request will still be sent, but without User-Name and Password attributes. There are no default values. The `radius_revive_period` parameter has been removed for unnecessary.
30. Modified: For flow the sign `p_flow_ → cmn.bts_check_ip |= ntconnt::bts_nat_must_whip` is set.
    The sign indicates that a call is coming from a private address and a public address is required for this flow. If no public address is assigned – attempts to allocate a public address continue (For TCP – only if SYN). This is because requests may come from a private address and only

then service 11 appears, but the flow already exists and will never work.

31. Modified: If a public address is set for flow, the presence of 11 services is checked. If there is no service, the public address is released.
32. [Router] Added: error message in `fastdpi_alert.log` "VRF has no TAP"
    If VRF does not have any device – it is impossible to announce address in such VRF. This error is displayed in `fastdpi_alert.log` not more than once per hour for each VRF
33. Added: fdpi_cli commands: `nat dump transcode`, `nat dump translater [profile name]`, `nat dump translater data [profile name]`
34. New policing profile name – BV###NNNNNNN[#MMMM][#++++--], where NNNNNN - incoming traffic rate in kbps, MMMM - outgoing traffic rate in kbps, + - class enabled, - class disabled. Description under Subscriber authorization attributes
35. [PCRF] Added: new `chaddr@opt60 value` for `radius_user_name_dhcp` option
    Example: `radius_user_user_name_dhcp=chaddr@opt60`, User-Name in Access-Request is formed from MAC-address of DHCP packet header (`chaddr` field) and option 60 if this option is in DHCP-request. Description under DHCP Radius proxy - Access-Request
36. Changed: improved FACEBOOK VIDEO detection
37. Fixed: when parsing `quic_ietf` for the first CRYPTO packet, if `offset==0` is set - checks for possible fragmentation
38. Added: parsing changes - minding the changes in Google QUIC versions: before version 34 there was an additional field "Private Flags". The SSG did not parse such packets. Since version 39 - changed byte order for "Data Length" record
39. Added policing and service 16 on values from profile name. Description under Subscriber authorization attributes
40. [BRAS] Added: new `bras_ip_filtering` option
    [hot] Traffic filtering (bitmask) is disabled (=0) by default.
    Allowed flags: `0x0001` - controlling IP spoofing (`restricting forged traffic`). The packet on subs → inet path is dropped if subscriber's IP address (srcIP) is unknown for L2 BRAS and bras_term_by_as = 0 and subscriber's AS is not `local. bras_ip_filtering=0`
41. [BRAS] Added: `bras_vrf_isolation` option - isolation at VRF level. Description under Soft-Router
    Added new `fastdpi.conf` option: [hot] VRF Isolation. By default (0), L2 BRAS does not isolate subscribers from different VRFs: If this mode is enabled (1), subscribers from different VRFs will be isolated from each other: for a subscriber from VRF1: the gateway must also be in VRF1, `local interconnect` will only work for subscribers from the same VRF1.
    `bras_vrf_isolation=0`
    When this option is enabled:
    - 1. ARP subscriber to gateway - processed by fastDPI only if subscriber and gateway are in the same VRF
    - 2. ICMP ping of gateway - processed by fastDPI only if the subscriber and gateway are in the same VRF
    - 3. `local interconnect` - applied only if both subscribers are in the same VRF.
42. Fixed: error messages for client should not contain LF in json
43. [BRAS][ARP] Modified: ARP processing to gateway. Respond to ARP request to gateway only if sender and gateway VRFs match (`sender` and GW are in the same VRF).
44. [VRF] Modified: VRF name assignment via service 254 (Radius only). Description under Soft-Router
45. [BRAS][DHCP-Proxy] Session-Timeout and Lease-Time for Framed-Pool.
    If an address is issued from Framed-Pool for a small amount of time (small `lease-time`) and a large session-timeout is specified during authorization, then all Renew/Rebind requests from the subscriber must be sent to the DHCP server via PCRF to renew the license, otherwise the DHCP server may think that the address is free. Reauthorization is done only when `session-`

`timeout` is reached

46. Added: support for service 16 - processing SYN requests and subsequent forwarding without transmitting packets to the Internet. Description under Subscriber authorization attributes
47. [Router] Added: `shared neighbor` cache for VRF.
    Added: `router_vrf { [cold][optional]` option to VRF configuration.
    String is the default ARP cache name for this VRF, each VRF has its own ARP/Neighbor cache isolated from others.
    If you want several different VRFs to share a common ARP/Neighbor cache, you should set the same value of the `neighbor_cache` option in the description of these VRFs.
    `neighbor_cache=… }`. Description under Soft-Router
48. [PCRF] fastpcrf.conf option `radius_user_name_dhcp` - added new value `opt61@opt60: radius_user_name_dhcp=opt61@opt60`. Description under DHCP Radius proxy - Access-Request
    User-Name in Access-Request is generated from DHCP options 61 and 60 if these options are present in the DHCP request.
    New fastpcrf.conf options - in which attributes to pass DHCP options to Access-Request
    [hot] Specify attributes in which DHCP options are passed. Assignment format: `attr_dhcp_opt43=vendorId.attrId` where vendorId is the vendor id, a number from 0 to 2^32-1.
    If `vendorId !=0`, the value is passed in the VSA attribute.
    If `vendorId == 0`, then the value is passed in the regular Radius attribute (non-VSA)
    attrId - attribute id, a number between 1 and 255
    Attributes are assumed to be of type octets (passed as is in binary form)
    Value 0.0 - do not pass this attribute to the Radius server.
    Default values are as follows: `attr_dhcp_opt43=0.0`, `attr_dhcp_opt60=43823.34 # VasExperts-DHCP-ClassId, attr_dhcp_opt61=43823.33 # VasExperts-DHCP-ClientId`
49. Added: support for service 16 and corresponding profile - job, delete, view via `fdpi_ctrl` profile matches the structure for service 5
    Example of setting: `fdpi_ctrl load profile -service 16 -profile.name portal_info_1 -profile.json '{ "ip_list" : "/var/lib/dpi/ip_list_1.bin", "redirect" : "http://info.test.ru" }'` parameter `max_profiles_serv16` - sets the maximum number of profiles. The default is 32. Description under Subscriber authorization attributes
50. [DHCP-Proxy] Introduced CoA Disconnect processing modes. Description under Radius CoA
    Added new `bras_dhcp_disconnect` option, which is a bitmask of the following flags:
    - `0x0001 - disable acct stop`, do not immediately send `acct stop` for a disconnected DHCP subscriber
    - `0x0002 - disable L3 auth`, do not perform L3 authorization for disconnected DHCP subscriber
    - `0x0004 - block traffic` - block all traffic from disconnected subscriber (i.e. on `subs → inet` path)
    - `0x0008` - respond to DHCP Request → NAK
    - `0x0010` - ignore DHCP Request (wait for DHCP Discovery)
51. [DHCP-Proxy] Added: control of subscriber IP address change
    If a subscriber is given a different IP address, the former IP address should be de-announced
52. [VRF][CLI] VRF support added to all router CLI commands

Changes in version 12.4

1. Added: support for individual session rate limiting protocols and definition of traffic classes at the channel and subscriber levels Info

```
#to support this service additional RAM will be required (compared to
standard requirements), it is reserved by setting
support_service_18=1 #in /etc/dpi/fastdpi.conf

speedtest cs1
default keep
cat dscp_prof_1.txt|lst2dscp /tmp/dscp_prof_1.dscp

speedtest tbf rate 16mbit inbound.rate 16mbit
bittorrent tbf rate 8Mbit
signal tbf rate 1kbit inbound.rate 2kbit
TCP Unknown tbf rate 8Mbit burst 1Mbit inbound.rate 8Mbit inbound.burst
1Mbit


cat tbf_prof_1.txt|lst2tbf /tmp/tbf_prof_1.tbf
#reverse conversion tbf2lst /tmp/tbf_prof_1.tbf

fdpi_ctrl load profile --service 18  --profile.name test_dscp --
profile.json '{ "dscp" : "/tmp/dscp_prof_1.dscp", "tbf" :
"/tmp/tbf_prof_1.tbf" }'
fdpi_ctrl load --service 18  --profile.name test_dscp --login DEMO
#or/and
fdpi_ctrl load --service 18  --profile.name test_dscp --vchannel 1
```

2. Added management of traffic processing levels at the VLAN level. The `hide` command allows you to do a traffic drop with pre-analysis. Info

```
fdpi_cli vlan group <id> drop
fdpi_cli vlan group <id> pass
fdpi_cli vlan group <id> hide
```

3. Added: service 17 (no profile) - mirroring traffic to a specified VLAN Info

```
#Parameters in fastdpi.conf:
span_vlan=123
span_trace=1
#For diagnostics you can use:
#trace_ip or span_trace or ajb_save_emit
#if you set service 12 and 17, then in pcap we will see original
recording and mirrored recording
```

4. [DPI] Fixed: when binding an IP to a login, check if this IP is already bound to this login. The `mtd_bind_ip_login` function for binding IP to login was unconditionally performing `unbind` before binding, without checking the current binding. `unbind` clears current services, including service 9 data (`netflow`, `accounting`), which led to quiet resetting of acct counters on

subscriber reauthorization if auth and acct synchronization in fastpcrf is disabled. This commit adds a check: if IP is already associated with a valid login - `bind`/`unbind`/`rebind` does not need to be done, `mtd_bind_ip_login` function just returns "ok" result.
5. Added "DTLS", "RTCP", "LIGHTWAY", "GOOGLE_MEET", "JITSY", "WECHAT", "DOT", "META_CALLS" protocols
6. Improved Skype detection in STUN
7. [FastRadius] Added extracting information from Radius avp `framed-ipv6-prefix`. Added sending `framed-ipv6-prefix` and `delegated-ipv6-prefix` over IPFIX
8. [SDS] Automatic UUID generation and saving in `/var/lib/dpi/sdsuuid.dat` file
9. [BRAS][ARP] Fixed: VLAN translation for ARP packets inet→subs
10. Added `radmin-port` protocol signature
11. Added support for IPv6 channels (with reload). Info
    Example of an assignment:

```
fe80::0/8 1
cat ipchannels6.txt | as2bin6 /etc/dpi/ipchannels6.bin
```

12. Added blocking of all IPv6 when service 4 and `block_options=4` are enabled
13. Fixed bug in TELEGRAM_TLS detector causing over-detection
14. Added support of reload for IPv6 channels
15. Fixed bug with AS numbers in IPFIX
16. Added LiveU protocol. Changed the name of the protocol `radmin-port` to `radmin`. List of new protocol identifiers:

```
DoT           49281
RTCP          49282
LIGHTWAY      49283
GOOGLE_MEET   49284
JITSY         49285
WECHAT        49286
DTLS          49287
META_CALLS    49288
LIVEU_LRT     49289
```

17. Added `vchannels_default=` setting to put traffic unallocated on other channels into a separate channel (but not 0!).
18. [Router] Fixed: building structures to divert traffic to TAP (Error of sorting IPv4-address array).
19. Added support for 18 services for vchannels
20. [BRAS] Fixed framed-pool support bug
21. Fixed: crusting when public address is highlighted (rare event: when removing NAT service at the moment of public highlighting)
22. Added support for 49 services for channels and subscribers: IPv6 traffic blocking Info

```
fdpi_ctrl load --service 49 --login DEMO
fdpi_ctrl load --service 49 --vchannel 1
```

23. Added: parameter `netflow_tos_format`, IPFIX TOS field data format: `netflow_tos_format=0` (default value), 3 bit (priority only), 1 6-bit (full DSCP) Info
24. Renamed protocol JITSY → JITSI
25. Fixed: for virtual channels DSCP is defined only if `support_service_18` parameter is set
26. Added: in `ipfix fullflow` added passing an additional field - original TOS from the IP header, it will be possible to build reports on external markup

27. ASN number accounting for GOOGLE MEET detection based on DTLS
28. [BRAS] Fixed: `dhcp nak issue`
29. Fixed channel detection in IPFIX for IPv6
30. Added: WECHAT protocol definition
31. Fixed: whatsapp_voice definition for TCP transport protocol
32. [PCRF][Framed-Pool] Adding opt125 with pool name as the first option. Reason: KEA parses only the first vendor when defining the client class (opt125) Info
33. Fixed definition of custom protocols based on IPv6 addresses/CIDR
34. Improved recognition of openvpn, holavpn, signal
35. Added the ability to supplement the definition of a signal
36. [BRAS][DHCP] Closing DHCP sessions after CoA Disconnect. If after PoD (CoA Disconnect) there is no DHCP request before the lease time expires, the session should be closed by sending a deanonce and acct stop. It should be taken into account that the subscriber's session type may change from DHCP to StaticIP or PPPoE; in this case, the DHCP session should be closed without deanonce and acct stop. Info
37. CLI: new parameter `ts_lease_expired` — lease end time — was added to the output of the `dhcp show` command.
38. [PCRF][ACCT] Added option `acct_disable_interim_update` — prohibit sending Interim-Update. Do not send Interim-Update: `acct_disable_interim_update=1`. Default `acct_disable_interim_update=0` (Interim-Update is sent) Info
39. Added possibility to use CIDR, addresses and ports for IPv4 and IPv6 in black and white lists. If CIDR or address is set, all TCP ports are blocked (UDP with the setting `udp_block=3`) Info
40. Added utilities to check for blacklisting `checklock` and custom protocol `checkproto`. The address or port address must be specified on the command line.
41. [PCRF][CoA] Added IPv6 support for CoA. `Command-Code=1` - search for acct session by IP. The acct session can be searched by IPv6 prefix attributes `Framed-IPv6-Prefix` or `Delegated-IPv6-Prefix`. The command response specifies all known IP addresses of the found acct-session - `Framed-IP-Address`, `Framed-IPv6-Prefix`, `Delegated-IPv6-Prefix`. Info
42. [BRAS][DHCP] Fixed: cli-command `dhcp show stat vrf`. Subscriber's `subs_id` was not checked when determining session "liveliness" - transfer of IP address to another subscriber may break this statistics
43. [BRAS][DHCP] Fixed: update `lease expired` for address from Framed-Pool
44. [BRAS][PPPoE] Added: Huawei vendor-specific support tag 1. The value is interpreted as `ADSL-Forum-Circuit-Id`. If PPPoE packet contains Circuit-Id and Huawei tag 1, Circuit-Id is preferred, Huawei tag1 is ignored Info
45. [BRAS][DHCP] Fixed: deanonization of the previous address if a new one is given to the client
46. [DPI] Fixed: stun processing for TCP
47. [DPI] Changed definition by realm: if another protocol is specified - the protocol is changed at once.

1)
on a typical configuration
2)
Machu Picchu the "Lost City of the Incas", located in the southern Peru on a 2,430-meter mountain ridge, a UNESCO World Heritage Site
3)
Record subscriber traffic in PCAP file